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UK CL (Edition J) B1C CADB CADC CAEB
INT CL[4] B01F

(54) Drive mechanism for use in a mixer

(57) A drive mechanism for use in a mixer comprises an outer, tubular, shaft (5) which drives a mixer head (4), from which projects a paddle shaft (11) for reception of a paddle (11a), whereby the paddle shaft (11), the axis of which is inclined with respect to the axis of the outer shaft (5), rotates about the latter axis. An inner shaft (8) is within the outer shaft (5) and drives the paddle shaft (11), so that it rotates about the axis of the paddle shaft (11), through the intermediary of a universal joint (9), two sprockets (13, 13a) and an endless member (14) which couples the two sprockets (13, 13a) to one another.

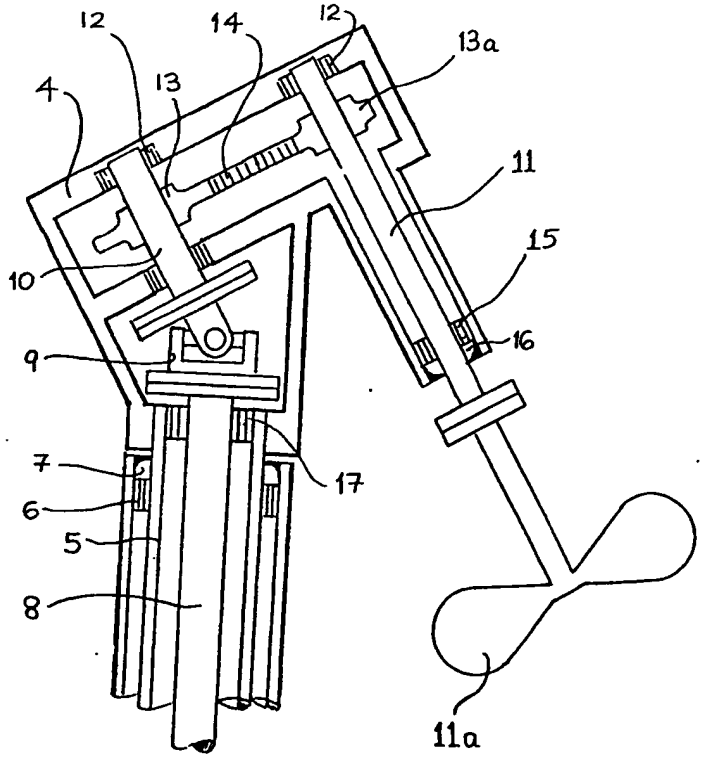

FIG. 2

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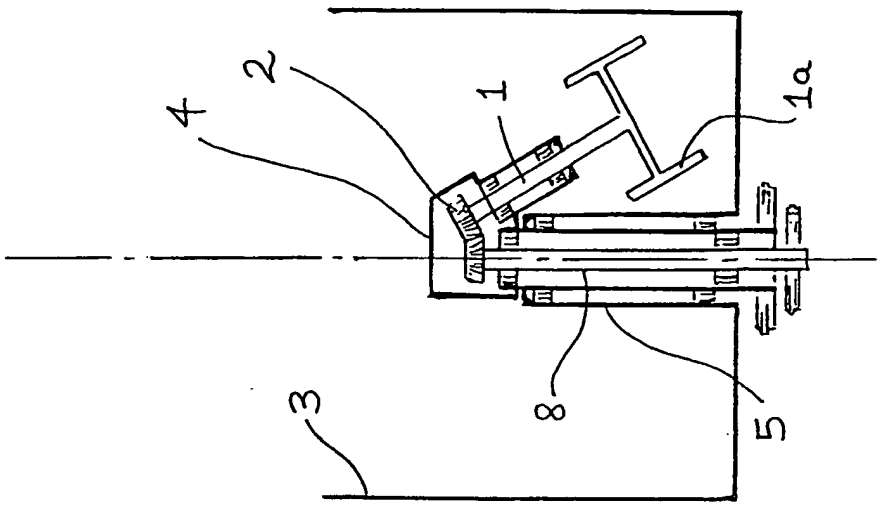


FIG.1C

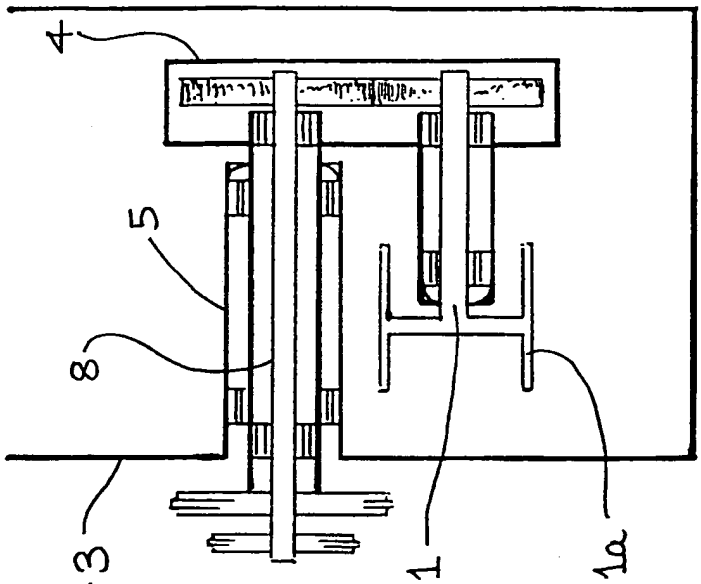


FIG.1b

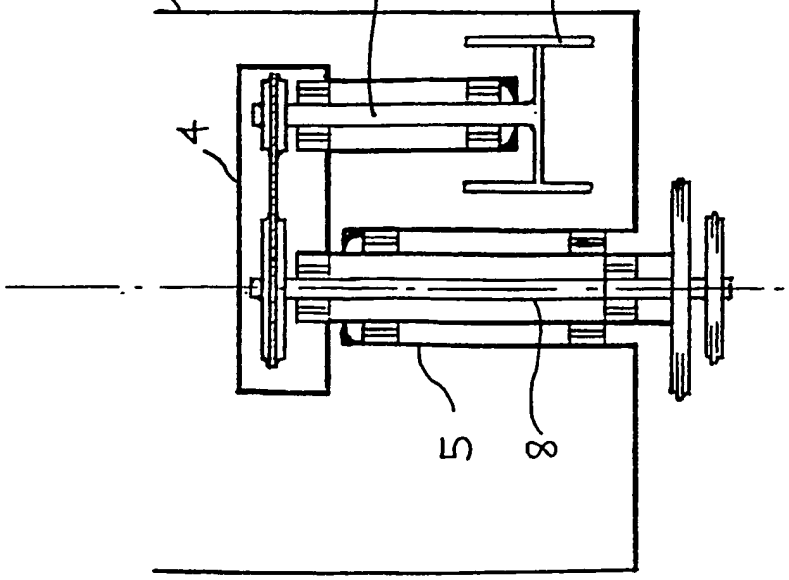


FIG.1a

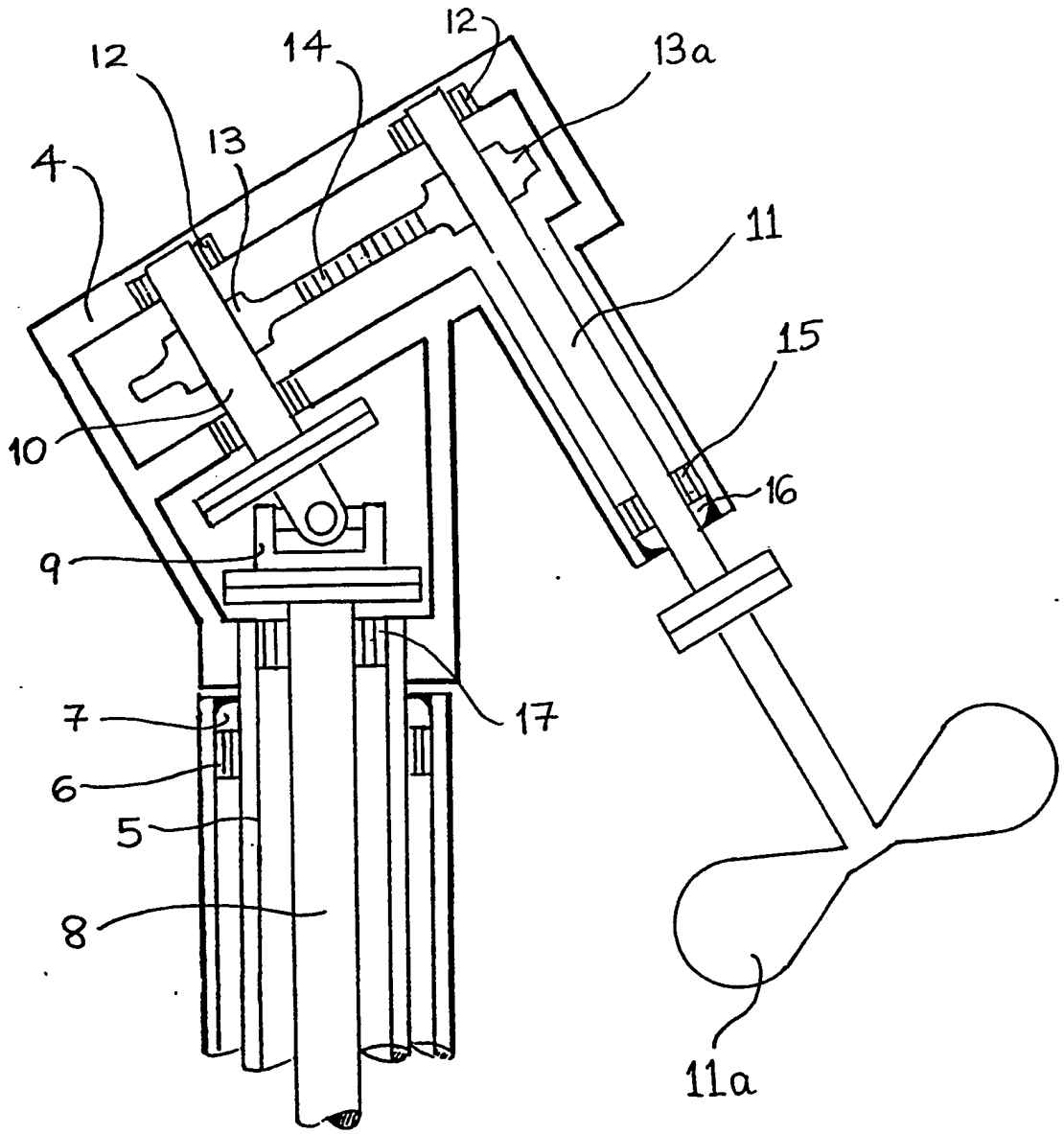


FIG. 2

FIG. 3

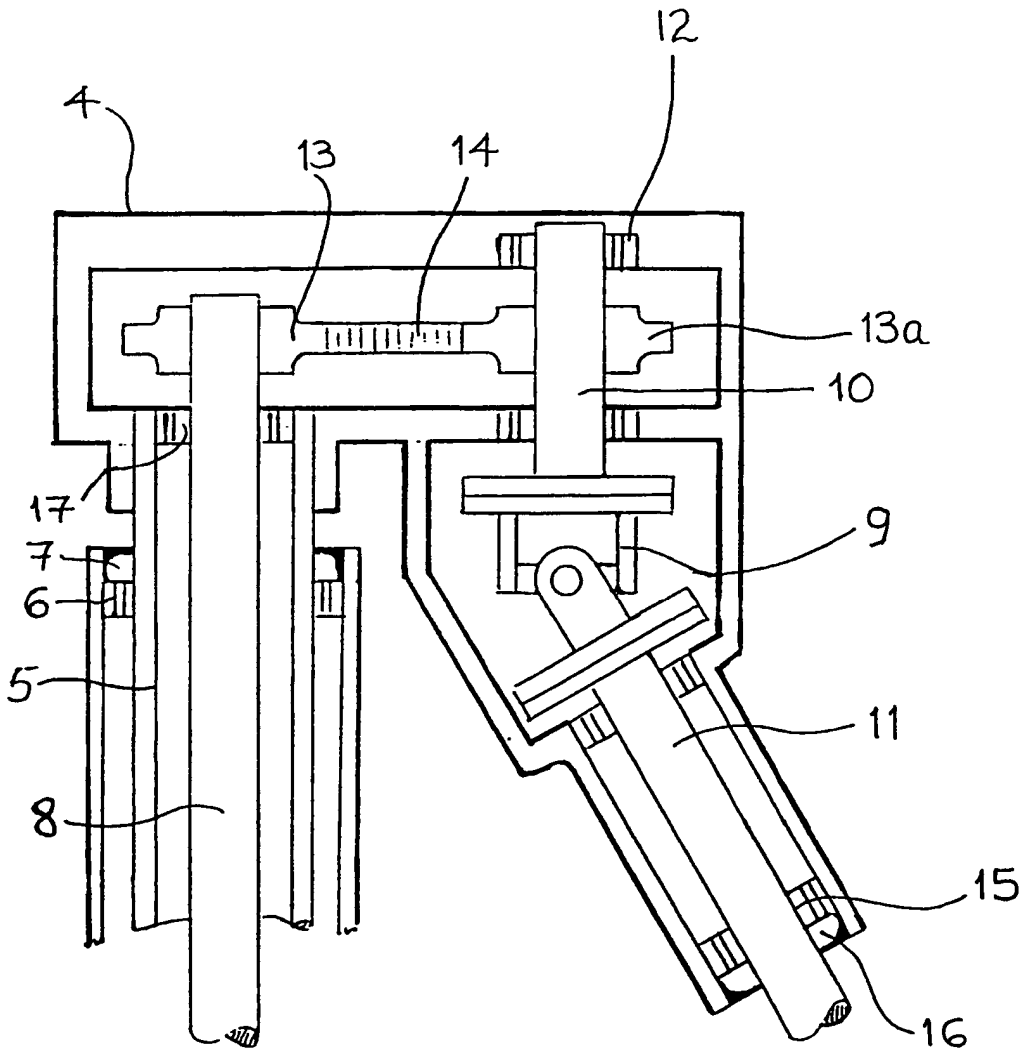


FIG. 4b

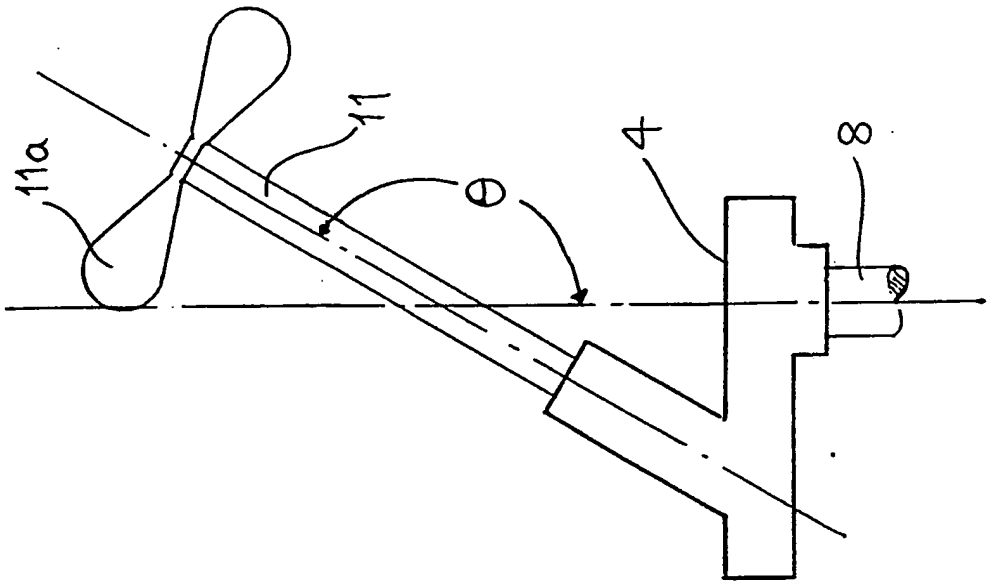
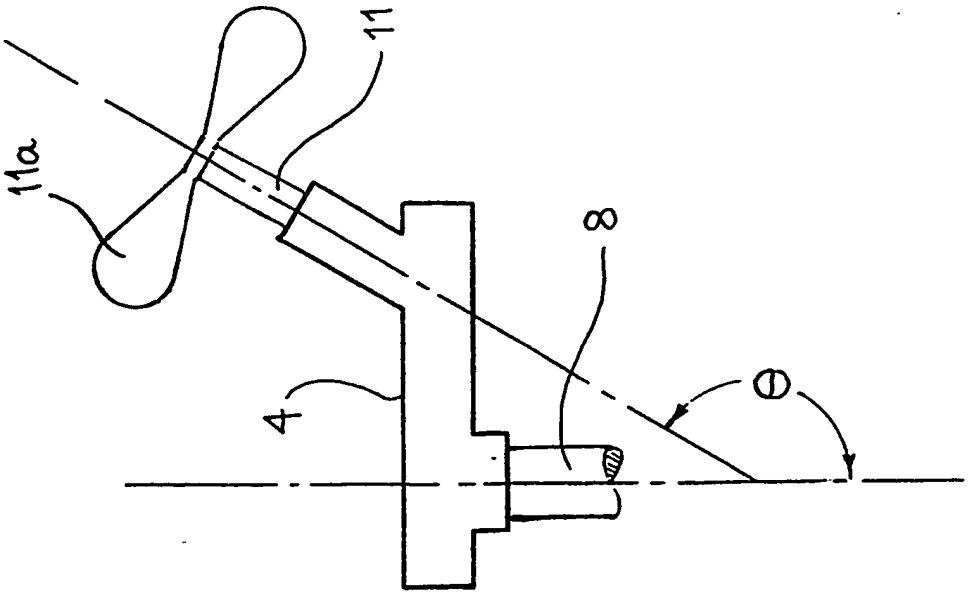


FIG. 4a



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A MECHANISM FOR USE IN A MIXER

The present invention relates to a mechanism suitable for use in a mixer, for example in a mixer known as a planetary mixer which is commonly used in the chemical, food processing and similar industries.

According to the present invention, there is provided a mechanism for use in a mixer comprising an outer, tubular, shaft which drives a mixer head, from which projects a paddle shaft for reception of a paddle, whereby the paddle shaft, the axis of which is inclined with respect to the axis of the outer shaft, rotates about the latter axis, and an inner shaft which is within the outer shaft and which drives the paddle shaft, so that it rotates about the axis of the paddle shaft, through the intermediary of a universal joint, two wheels and an endless member which couples the two wheels to one another.

In a first embodiment of the present invention one of the said wheels is mounted so as to rotate with a further shaft, coupled to the said inner shaft by means of the said universal joint, and the other of the said wheels is mounted so as to rotate with the said paddle shaft.

In a second embodiment of the present invention one of the said wheels is mounted so as to rotate with the said inner shaft and the other of the said wheels is mounted so as to rotate with a further shaft, coupled to the said paddle shaft by means of the said universal joint.

Reference will now be made, by way of example, to the accompanying drawings, in which:

Figs. 1a, 1b and 1c show three typical examples of known mixers, Fig. 1a illustrating a mixer with a vertical planetary action, Fig. 1b illustrating a mixer with a horizontal planetary action, and Fig. 1c

illustrating a mixer with a diagonal planetary action;

Fig. 2 shows a first mixer embodying the present invention;

Fig. 3 shows a second mixer embodying the present invention; and

Figs. 4a and 4b illustrate further embodiments of the present invention.

Each of the known mixers illustrated in Figs. 1a, 1b and 1c comprises an outer tubular shaft 5 which drives a mixer head 4, located within a mixer vessel 3. The vessel 3 is typically, but not necessarily, cylindrical with its centre line vertical. The profile of the vessel in sectional view is not relevant to the present invention. If desired, the vessel may have a jacket around it for the purpose of heating or cooling the contents of the vessel.

From the mixer head 4 there projects a planetary paddle shaft 1 for reception of a paddle 1a. Thus, the paddle shaft 1, the axis of which is parallel to (Figures 1a and 1b) or inclined with respect to (Figure 1c) the axis of the outer shaft 5, rotates about the latter axis. Each mixer further comprises an inner shaft 8, which is located within the outer shaft 5 and drives the paddle shaft 1 so that the paddle shaft 1 also rotates about its own axis.

In mixers which carry out vertical or horizontal planetary action, the rotation of the inner shaft 8 may be transmitted to the paddle shaft 1 by means of a belt, chain or gear wheels. In diagonal planetary mixers, however, it has only been known previously to transmit the rotation of the inner shaft 8 to the paddle shaft 1 by means of bevel gears 2.

In the present application, mixers of the diagonal planetary action type are proposed in which the rotation of the inner shaft 8 is transmitted to the paddle shaft 1 by means other than the bevel gears 2

used conventionally.

Fig. 2 shows a mixer comprising an outer, tubular, shaft 5 which drives a mixer head 4 attached thereto at one end thereof, the outer shaft 5 itself being driven at its other end by a motor (not shown) of known type. The outer shaft 5 is supported by a bearing 6 of known type and a seal 7 of known type prevents the ingress of the vessel contents to the bearing 6.

Within the outer shaft 5 is an inner shaft 8 mounted in a bearing 17 and terminating in a universal joint 9 of known type. The universal joint 9 transmits the motion of the shaft 8 through an angle to a slave shaft 10, the longitudinal axis of which is parallel to the longitudinal axis of a paddle shaft 11, which projects downwardly from the mixer head 4 and carries a paddle 11a. Thus, the longitudinal axis of the paddle shaft 11 is inclined with respect to that of the outer shaft 5. The paddle shaft 11 is mounted in bearings 15 of known type protected by a seal 16 of known type.

The slave shaft 10 is mounted in bearings 12 of known type and carries a sprocket 13. The sprocket 13 drives a chain 14 which transmits the rotation of the slave shaft 10, driven by the inner shaft 8, to the paddle shaft 11, which also carries a sprocket 13a.

Thus, instead of the bevel gear arrangement employed in known diagonal planetary mixers, according to the present invention the rotation of the inner shaft 8 is transmitted to the paddle shaft 11 through the intermediary of a universal joint, two wheels and an endless member which couples the wheels to one another.

The mixer shown in Fig. 3 differs from that shown in Figure 2 only in that the slave shaft 10 is coupled to the paddle shaft 11, through a universal joint 9, rather than to the inner shaft 8, the longitudinal axis of the slave shaft 10 being parallel to the

longitudinal axis of the outer shaft 5.

The embodiments shown in Figs. 4a and 4b differ from those shown in Figs. 2 and 3 only in that the paddle shaft 11 projects upwardly from the mixer head 4, so as to be inclined to the longitudinal axis of the inner shaft at an obtuse angle θ. The paddle shaft 11 may extend from the mixer head 4 towards (Fig. 4b) or away from (Fig. 4a) the longitudinal axis of the outer shaft 5. In the embodiments shown in Figs. 4a and 4b the position of the universal joint 9 may be as shown in either Fig. 2 or Fig. 3.

In all embodiments of the present invention the position of entry of the drive shaft in relation to the vessel 3 is variable. For example the drive shaft could enter from the bottom, the top, the side or at any angle to the wall faces of the vessel 3.

It should be clear that in each of the embodiments shown in Figures 2, 3, 4a and 4b, the chain 14 could be replaced by toothed belting, or the sprockets and chain could be replaced by belt wheels and flat or V belting.

CLAIMS:

1. A mechanism for use in a mixer comprising an outer, tubular, shaft which drives a mixer head, from which projects a paddle shaft for reception of a paddle, whereby the paddle shaft, the axis of which is inclined with respect to the axis of the outer shaft, rotates about the latter axis, and an inner shaft which is within the outer shaft and which drives the paddle shaft, so that it rotates about the axis of the paddle shaft, through the intermediary of a universal joint, two wheels and an endless member which couples the two wheels to one another.

2. A mechanism as claimed in claim 1, wherein one of the said wheels is mounted so as to rotate with a further shaft, coupled to the said inner shaft by means of the said universal joint, and the other of the said wheels is mounted so as to rotate with the said paddle shaft.

3. A mechanism as claimed in claim 1, wherein one of the said wheels is mounted so as to rotate with the said inner shaft and the other of the said wheels is mounted so as to rotate with a further shaft, coupled to the said paddle shaft by means of the said universal joint.

4. A mechanism which is for use in a mixer and is substantially as hereinbefore described with reference to Figure 2 or Figure 3 of the accompanying drawings, or either of Figures 2 and 3 with the modification shown in Figure 4a or Figure 4b.

5. A mixer incorporating a mechanism as claimed in any preceding claim.

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